IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Original): A pattern matching method for performing template matching on a waveform of a signal, a value of the signal varying according to at least a parameter, the pattern matching method comprising:

a first step of estimating an occurrence probability distribution of signal values at respective values of the parameter based on a plurality of measured signal waveforms;

a second step of generating a waveform template including an expected value of signal value at each value of the parameter and a probability template including a piece of occurrence probability information of the expected value at each value of the parameter based on the occurrence probability distribution; and

a third step of performing template matching between a newly measured signal waveform and the waveform template by using the piece of occurrence probability information of each of the expected values, which compose the probability template, as a piece of weight information at each value of the parameter.

Claim 2 (Original): The pattern matching method according to claim 1, wherein the occurrence probability distribution is a normal distribution.

Claim 3 (Original): The pattern matching method according to claim 1, wherein each of the expected values is an average value of signal values measured at each value of the parameter, and wherein each piece of the occurrence probability information is in accord with a probability density function value, for the respective expected value, of the occurrence probability distribution.

Claim 4 (Original): The pattern matching method according to claim 1, further comprising:

a fourth step in which a new waveform template including a new, expected value of a signal value at each value of the parameter and a new probability template including a piece of occurrence probability information of the new, expected value at each value of the parameter are generated based on the new signal waveform and the occurrence probability distribution; and

wherein the fourth step and the third step are repeated sequentially.

Claim 5 (Currently Amended): A pattern matching method of performing template matching between a waveform template, as a registered template, generated based on a plurality of measured signal waveforms and a subsequently measured signal waveform, comprising:

a first step of performing template matching between the registered template and a newly measured waveform; and

a second step of generating a new waveform template based on a plurality of waveforms ~~further~~ including the signal waveform used for generating the registered template and the ~~new~~ newly measured signal waveform, and replacing the registered template with the new template; and

wherein the first step and the second step are repeated sequentially.

Claim 6 (Original): The pattern matching method according to claim 5, wherein the second step comprises:

a third step of estimating an occurrence probability distribution of signal values at respective values of a parameter based on the plurality of waveforms, the parameter relating to changes of a waveform; and

a fourth step in which a waveform template including an expected value of a signal value at each value of the parameter and a probability template including a piece of occurrence probability information of the expected value at each value of the parameter are generated based on the occurrence probability distribution.

Claim 7 (Original): The pattern matching method according to claim 6, wherein the occurrence probability distribution is a normal distribution.

Claim 8 (Original): The pattern matching method according to claim 6, wherein each of the expected values is an average value of signal values measured at each value of the parameter, and wherein each piece of the occurrence probability information is in accord with a probability density function value, for the respective expected value, of the occurrence probability distribution.

Claim 9 (Previously Presented): A pattern matching unit that performs template matching on a waveform of a signal, a value of the signal varying according to value change of at least a parameter, the pattern matching unit comprising:

a template generator which generates a waveform template including an expected value of a signal value at each value of the parameter and a probability template including a piece of occurrence probability information of the expected value at each value of the

parameter based on the occurrence probability distribution of signal values for the respective values of the parameter, the distribution being estimated from a plurality of measured signal waveforms; and

a matching judgment unit which is electrically connected to the template generator and which performs template matching between a newly measured signal waveform and the waveform template by using pieces of occurrence probability information of the expected values as pieces of weight information at respective values of the parameter, the pieces of occurrence probability information composing the probability template.

Claim 10 (Original): The pattern matching unit according to claim 9,

wherein the template generator generates a new waveform template and a new probability template based on the new signal waveform and the occurrence probability distribution.

Claim 11 (Currently Amended): A pattern matching unit that performs template matching, comprising:

a template generator which generates a waveform template based on a plurality of measured signal waveforms and registers the generated template as a registered template; and

a matching judgment unit which is electrically connected to the template generator and which performs template matching between a newly measured signal waveform and the registered template; and

wherein the template generator generates a new waveform template based on the plurality of signal waveforms used for generating the registered template and the ~~new~~ newly measured signal waveform and replaces the registered template with the new template.

Claim 12 (Withdrawn): A position detection method of detecting a position of a specific mark formed on a detected body, comprising:

a first measurement step of measuring a plurality of marks having almost the same shape as the specific mark, the marks being formed on the detected body;

a second measurement step of measuring the specific mark;

a pattern matching step of performing pattern matching through use of a pattern matching method according to claim 1, the pattern matching method using signal waveforms measured at the plurality of marks as a plurality of signal waveforms, a signal waveform measured at the specific mark as a new signal waveform, and positions as values of a parameter; and

a position detection step of obtaining positional information of the specific mark, based on the pattern matching results.

Claim 13 (Withdrawn): The position detection method according to claim 12, wherein the specific mark changes periodically in a first direction, and wherein values of the parameter are positions in the first direction.

Claim 14 (Withdrawn): The position detection method according to claim 13, wherein the specific mark also changes periodically in a second direction that is different from the first direction, and wherein the parameter represents a two-dimensional position in a plane defined by the first and second directions.

Claim 15 (Withdrawn): A positional detector that detects a position of a specific mark formed on a detected body, comprising:

a measurement unit measuring the specific mark and a plurality of marks having almost the same shape as the specific mark, the marks being formed on the detected body;

a pattern matching unit according to claim 9, performing pattern matching by using signal waveforms measured at the plurality of marks as a plurality of signal waveforms, a signal waveform measured at the specific mark as a new signal waveform, and positions as values of a parameter; and

a processing unit of obtaining positional information of the specific mark, based on the pattern matching results.

Claim 16 (Withdrawn): The positional detector according to claim 15, wherein the measurement unit comprises a picking-up unit to pick up marks formed on the detected body, and the signal waveform is composed of changes, between positions, of a light intensity in a mark image picked up by the picking-up unit.

Claim 17 (Withdrawn): An alignment method of aligning a detected body on which a first number of marks having almost the same shape as one another are formed, comprising:

a mark position detection step of detecting positional information of a second number of marks through use of a position detection method according to claim 12, by sequentially using as a specific mark each of the second number of marks selected from the first number of marks; and

an alignment step of aligning the detected body, based on the positional information of the second number of marks detected in the mark position detection step.

Claim 18 (Withdrawn): An alignment unit that aligns a detected body on which a first number of marks having almost the same shape as one another are formed, comprising:

a position detector according to claim 15, detecting positional information of a second number of marks by sequentially using as a specific mark each of the second number of marks selected from the first number of marks; and

a position controller to align the detected body, based on the positional information of the second number of marks detected in the position detector.

Claim 19 (Withdrawn): An exposure method of transferring a pattern formed on a mask onto divided areas on a substrate, comprising:

a divided area position detection step in which positional information of the divided areas on the substrate is obtained by detecting positional information, relative to the substrate, of a second number of alignment marks through use of a position detection method according to claim 12 while sequentially using as a specific mark each of the second number of alignment marks selected from a first number of alignment marks that are formed on the substrate as a detected body and have almost the same shape as one another; and

a transferring step of transferring the pattern onto the divided areas while aligning the substrate based on the positional information of the divided areas on the substrate obtained in the divided area position detection step.

Claim 20 (Withdrawn): The exposure method according to claim 19, wherein the plurality of divided areas are arranged in a matrix-shape on the substrate, wherein the alignment mark comprises a third number of a first alignment marks having almost the same shape as one another and a fourth number of a second alignment marks having almost the

same shape as one another, the first and second alignment marks being used respectively for aligning in row direction of the matrix and for aligning in column direction of the matrix,

wherein in the divided area position detection step, positional information, in the row direction on the substrate, of a fifth number of first alignment marks is obtained through use of a position detection method according to claim 12 while sequentially using as a specific mark each of the fifth number of first alignment marks selected from the third number of first alignment marks, and also positional information, in the column direction on the substrate, of a sixth number of second alignment marks is obtained through use of a position detection method according to claim 12 while sequentially using as a specific mark each of the sixth number of second alignment marks selected from the fourth number of second alignment marks, and wherein positional information, relative to the substrate, of the divided areas is obtained by statistically processing the positional information in the row direction of the fifth number of first alignment marks and the positional information in the column direction of the sixth number of second alignment marks.

Claim 21 (Withdrawn): An exposure apparatus for transferring a pattern formed on a mask onto divided areas on a substrate, comprising:

a stage unit moving the substrate along a predetermined plane; and

a position detector according to claim 15, obtaining positional information of a second number of positional marks by sequentially using as a specific mark each of the second number of alignment marks selected from a first number of alignment marks that are formed on the substrate as a detected body and have almost the same shape as one another.

Claim 22 (Withdrawn): A device manufacturing method including a lithography process, wherein in the lithography process, a predetermined pattern is transferred onto divided areas on a substrate according to an exposure method as recited in claim 19.

Claim 23 (Canceled)

Claim 24 (Withdrawn): A positional detection method of detecting a position of a specific mark formed on a detected body, comprising:

measuring a plurality of marks having almost the same shape as the specific mark, the marks being formed on the detected body;

measuring the specific mark;

performing pattern matching through use of a pattern matching method according to claim 5, the pattern matching method using signal waveforms measured at the plurality of marks as a plurality of signal waveforms, a signal waveform measured at the specific mark as a new signal waveform, and positions as values of a parameter; and

obtaining positional information of the specific mark, based on the pattern matching results.

Claim 25 (Withdrawn): The positional detection method according to claim 24, wherein the specific mark changes periodically in a first direction, and wherein values of the parameter are positions in the first direction.

Claim 26 (Withdrawn): The positional detection method according to claim 25, wherein the specific mark also changes periodically in a second direction that is different from the first direction, and wherein the parameter represents a two-dimensional position in a plane defined by the first and second directions.

Claim 27 (Withdrawn): A positional detector that detects a position of a specific mark formed on a detected body, comprising:

a measurement unit measuring the specific mark and a plurality of marks having almost the same shape as the specific mark, the marks being formed on the detected body;

a pattern matching unit according to claim 11, performing pattern matching by using signal waveforms measured at the plurality of marks as a plurality of signal waveforms, a signal waveform measured at the specific mark as a new signal waveform, and positions as values of a parameter; and

a processing unit of obtaining positional information of the specific mark, based on the pattern matching results.

Claim 28 (Withdrawn): The positional detector according to claim 27, wherein the measurement unit comprises a picking-up unit to pick up marks formed on the detected body, and the signal waveform is composed of changes, between positions, of a light intensity in a mark image picked up by the picking-up unit.

Claim 29 (Withdrawn): An alignment method of aligning a detected body on which a first number of marks having almost the same shape as one another are formed, comprising:

detecting positional information of a second number of marks through use of a positional detection method according to claim 24, by sequentially using as a specific mark each of the second number of marks selected from the first number of marks; and

aligning the detected body, based on the positional information of the second number of marks detected in the mark positional information detection.

Claim 30 (Withdrawn): An alignment unit that aligns a detected body on which a first number of marks having almost the same shape as one another are formed, comprising:

a position detector according to claim 27, detecting positional information of a second number of marks by sequentially using as a specific mark each of the second number of marks selected from the first number of marks; and

a position controller to align the detected body, based on the positional information of the second number of marks detected in the position detector.

Claim 31 (Withdrawn): An exposure method of transferring a pattern formed on a mask onto divided areas on a substrate, comprising:

divided area position detection in which positional information of the divided areas on the substrate is obtained by detecting positional information, relative to the substrate, of a second number of alignment marks through use of a positional detection method according to claim 24 while sequentially using as a specific mark each of the second number of alignment marks selected from a first number of alignment marks that are formed on the substrate as a detected body and have almost the same shape as one another; and

transferring the pattern onto the divided areas while aligning the substrate based on the positional information of the divided areas on the substrate obtained in the divided area position detection.

Claim 32 (Withdrawn): The exposure method according to claim 31, wherein the plurality of divided areas are arranged in a matrix-shape on the substrate, wherein the alignment mark comprises a third number of a first alignment marks having almost the same shape as one another and a fourth number of a second alignment marks having almost the same shape as one another, the first and second alignment marks being used respectively for aligning in row direction of the matrix and for aligning in column direction of the matrix,

wherein in the divided area position detection, positional information, in the row direction on the substrate, of a fifth number of first alignment marks is obtained through use of a positional detection method according to claim 12 while sequentially using as a specific mark each of the fifth number of first alignment marks selected from the third number of first alignment marks, and also positional information, in the column direction on the substrate, of a sixth number of second alignment marks is obtained through use of a positional detection method according to claim 12 while sequentially using as a specific mark each of the sixth number of second alignment marks selected from the fourth number of second alignment marks, and wherein positional information, relative to the substrate, of the divided areas is obtained by statistically processing the positional information in the row direction of the fifth number of first alignment marks and the positional information in the column direction of the sixth number of second alignment marks.

Claim 33 (Withdrawn): An exposure apparatus for transferring a pattern formed on a mask onto divided areas on a substrate, comprising:

a stage unit moving the substrate along a predetermined plane; and

a position detector according to claim 27, obtaining positional information of a second number of positional marks by sequentially using as a specific mark each of the second number of alignment marks selected from a first number of alignment marks that are formed on the substrate as a detected body and have almost the same shape as one another.

Claim 34 (Withdrawn): A device manufacturing method including a lithography process, wherein in the lithography process, a predetermined pattern is transferred onto divided areas on a substrate according to an exposure method as recited in claim 31.

Claim 35 (New): A pattern matching method of performing template matching between a waveform template, as a registered template, generated based on a plurality of measured signal waveforms and a subsequently measured signal waveform, comprising:

a first step of performing template matching between the registered template and a newly measured waveform; and

a second step of generating a new waveform template based on a plurality of waveforms including the registered template and the newly measured signal waveform and replacing the registered template with the new template; and

wherein the first step and the second step are repeated sequentially.

Claim 36 (New): A pattern matching unit that performs template matching, comprising:

a template generator which generates a waveform template based on a plurality of measured signal waveforms and registers the generated template as a registered template; and

a matching judgment unit which is electrically connected to the template generator and which performs template matching between a newly measured signal waveform and the registered template; and

wherein the template generator generates a new waveform template based on the registered template and the newly measured signal waveform and replaces the registered template with the new template.